Draft Design for FlexLine Terminator Circuit Board

Dominic Benford; July 1, 2002.

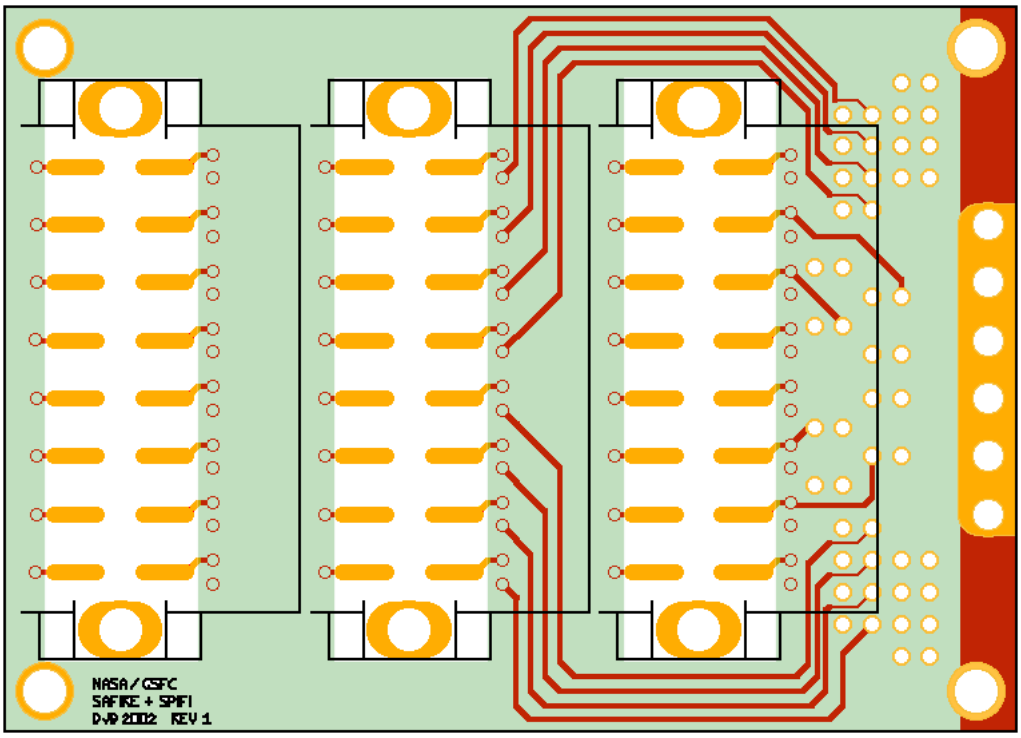
This circuit board is designed terminate 3 NIST 8-channel FlexLines and provide fanout to cryogenic detector parts. The board will accommodate 3 of the 1" wide lines using the compression connection, will support shunt and load resistors, and will be attached to a set of 3x8 pair (using soldered holes and a strain relief) Tekdata woven cable of CuNi/NbTi twisted pairs that couples to the SA Housing or the detector array. The Tekdata cable will be 12" or 18" long (we should choose which) and will terminate in a 51-pin Nanonics connector.

The board is designed as a 4-layer board with a 1/16" overall thickness. It is 1.75" long and 1.25" wide and requires gold plate, soldermask, and silkscreen on both outer surfaces.

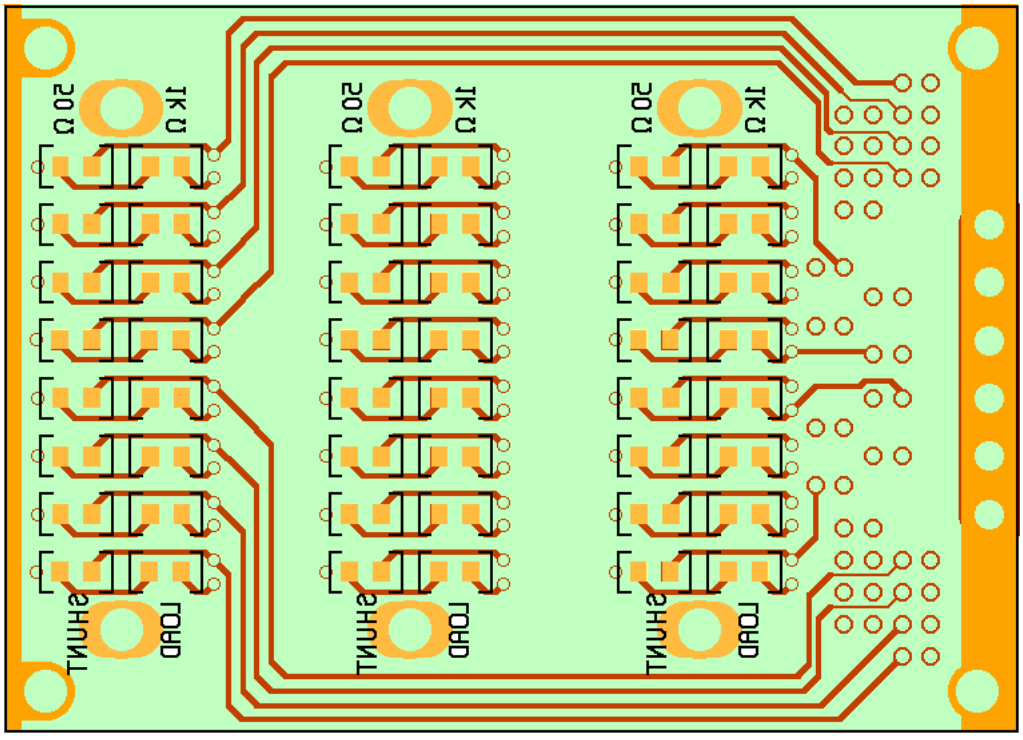
The board has been designed with a few considerations:

- The shunt and load resistors (nominally 50Ω and 1kΩ) are accommodated compactly.
- The high speed signal (from SA) or feedback (to Detector) lines are connected to the innermost contact to yield very short lengths of unknown-impedance wiring.
- The low speed signals are microstripped, but with no impedance control. This may help reduce crosstalk.
- There is a metallized bank for soldering a small copper or brass bracket in place to which we will ask Tekdata to epoxy the cables for strain relief. The Tekdata cable will be soldered into the array of holes at the right of the board and will be potted for ruggedness.
- The 4 holes around the outside edge shall be for 1-72 screws. A brass or copper board will be bolted underneath as a nut plate and mounting bracket. The six internal holes are also for 1-72 screws, but to attach the clamp for the FlexLine connector.
- I am assuming that during assembly, a skilled craftsman will solder the resistors or shorts into place. Soldermask has been provided for that purpose.
- One weakness of this design is that, for any Tower Card stack consisting of two of these 3-FlexLine assemblies, the cards want to be overlayed. Because they overlay by only 1/4", perhaps one set of 3 FlexLines can be slack by that much. Alternatively, the FlexLines will have to be tilted away from each other. This is a tricky part of the assembly that I don't have a good answer for.

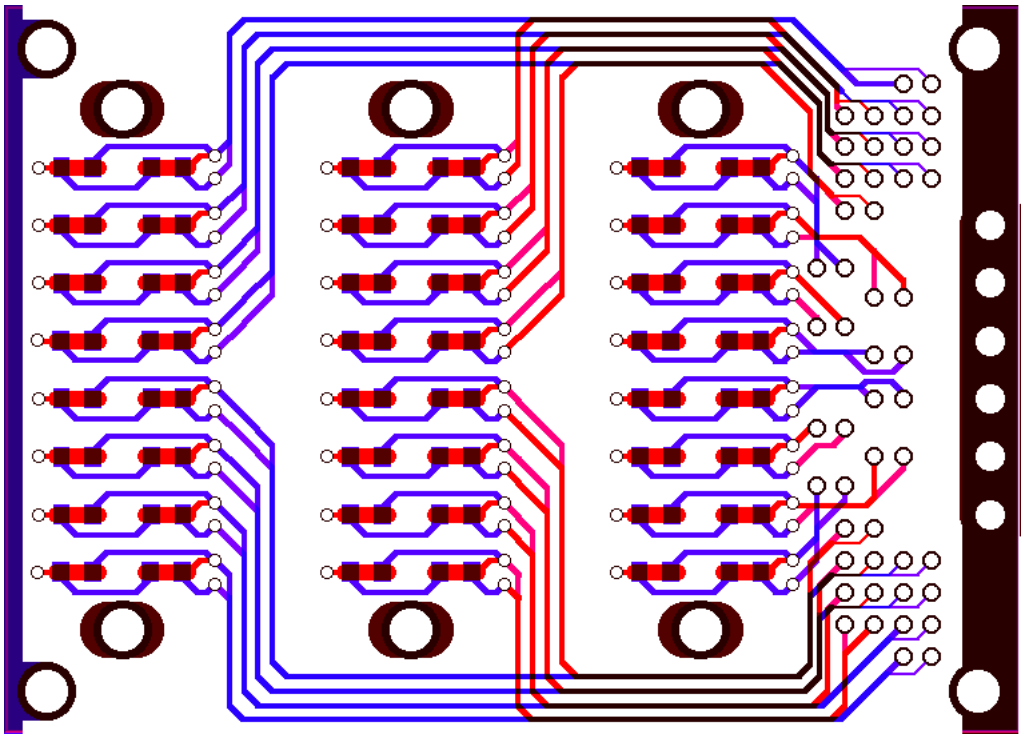
The top layer contains the top wiring, connections in gold, soldermask to protect traces, and silkscreen for FlexLine installation alignment:



The bottom layer contains the bottom wiring, solder pads in gold, soldermask to protect traces, and silkscreen for instructions:



If you view the four wiring layers alone, the circuit should be discernable (top=red, upper=magenta, lower=violet, bottom=blue):



The termination resistor set (baseline only!) could be:

Line	**Shunt**	**Load**	**Notes**
Detector bias	∞	1kΩ	
2nd FB	50Ω	1kΩ	
1st FB	50Ω	1kΩ	Fast line (closest to Tekdata)
2nd Bias	∞	1kΩ	
3rd FB	50Ω	1kΩ	
3rd Out	∞	0	Fast line (closest to Tekdata)

For simplicity, the position of each card in the Tower might be best if it's as listed in this table, top-to-bottom. This positions the FlexLine ends in the proper orientation and position, and divides the Tekdata cables correctly.